Technique eliminates expense of actively aligning devices

A novel new hybrid assembly technique which offers a very simple, yet highly reliable, method of integrating optical devices has been developed at the Centre for Integrated Photonics (CIP) Ipswich, UK. CIP is a supplier of advanced photonic hybrid ICs and InP-based optoelectronic chips, devices and modules with its own development and manufacturing facilities in the UK.

In the previous issue, *III-Vs Review* reported on a joint project involving the UK DTI funding for the development of advanced InP-based photonic materials and devices. The collaborators are CIP, Bookham, Epichem, Loughborough Surface Analysis, the University of Sheffield and the University of Surrey*.

In this instance, the focus is on another key aspect of the refinement of high performance optical systems. The new technique eliminates one of the more problematic stages in the production sequence for optical modules. Companies presently have to endure the expense of actively aligning devices and would prefer to deploy a more cost-effective platform in order to fabricate the sophisticated building-blocks required for advanced optical networking.

"Hybrid integration is an optimal way forward for many of the optical functions needed in advanced optical networks, but most of the assembly techniques in mainstream use today rely on highly skilled labour and expensive equipment, and do not scale," says Graeme Maxwell, CIP's VP of Hybrid Research & Development.

"Our technique requires just passive assembly, yet provides very low insertion losses - making it possible to create single-module solutions for applications such as packet switches and signal regenerators".

Basically, it achieves the integration via the plugging of the silicon daughterboards that carry individual optical components into a planar silica motherboard - each having precision-machined mating faces. The components themselves also employ simple interface modifications - namely mode expansion, and features to support precision cleaving. The result turns hybrid photonic integration into a similar form of process to that used for assembling electronic PCBs - with the planar silica motherboard providing the equivalent of printed wiring.

The assembly technique has been developed and refined over ten years, and has been highly optimised for low interface losses and ease of assembly, and does not involve any complex processing or etching. The technique is also highly scalable, and applies equally well to two devices or a large subsystem integrating many component elements.

CIP has manufactured numerous devices using the technique, such as its 2R regenerator - a recently announced commercial device that is attracting a lot of interest from optical network developers.

On this example of its hybrid integration, the component integrates a planar silica Mach-Zehnder interferometer (MZI) and a monolithic quad semiconductor optical amplifier (SOA) array to create a dual-channel 2R regenerator with just a 1dB loss at daughterboard/motherboard interfaces.

The assembly technique has evolved from considerable R&D undertaken by CIP staff during the business' history as part of BT, then Corning and, for the last two years, as an independent photonic design and manufacturing consultancy. CIP offers the technology in a variety of forms to suit different applications and users. These include technology consultancy to support design-in, funded development programs, and the provision of turnkey hybrid component solutions - such as its multi-channel 2R regenerator.

"We believe this hybrid integration technique provides the performance, reliability and economy to address many of the sophisticated component functions necessary for advanced optical switched fabrics," added Maxwell. "Among the potential applications are reconfigurable add-drop multiplexers, 2R and 3R signal regenerators, high-speed interconnect, packet switches, WDM PON devices and optical buffer memories. In each of these cases I expect our platform approach to offer considerable cost reduction and performance advantages over current component solutions and integration methods."

For more details, visit: www.ciphotonics.com

*"InP Focus is Al and Ru", *III-Vs Review*, Volume 19, Issue 2, March 2006, Pages 31-34.

High voltage isolation to 20kV

A lower profile but still very important segment of the LED business is optocouplers. High speed, robust components are continually being developed for an ever-growing range of industrial applications. Texas-based OPTEK Technology is, for example, providing designers with the means to transmit data from one high voltage potential to another at varying distances, and has developed an axial optical isolator designed to provide electrical isolation and data transfer.

"The OPI1270 Series devices were designed for applications that require high voltage isolation between input and output or transmission of a signal from one location to another on the same or adjacent PC board," said Roland Chapa, OPTEK Technology's Assemblies Business Unit director. "The heavy-duty opaque housing and shrouded cable shields the optical signal from dust, dirt, oil and other particles, making the isolator ideal for contaminated environments."

The OPI1270 Series axial analog isolator consists of a visible red AlInGaP LED emitter and a phototransistor detector housed in separate opaque moulded plastic housings and coupled by a shrouded optical cable that gives the device extremely high noise immunity. The isolators are offered with standard lengths of 32-, 40- and 80-mm, and can be produced in custom lengths up to 10m or longer. Applications for the OPI1270 Series isolator include industrial, medical, and office equipment, as well as electrical isolation circuits in harsh environments.

For more details, visit: www.OPTEKinc.com/irsmd